REMARKS

Claims 1-28 are in the application.

Claims 2 and 22-24 are amended to correct informalities noted by the examiner.

In addition, claim 8 is amended to correct a typographical error.

Claims 1-2, and 5-6 and 11-14 are rejected under 35 U.S.C. § 102(b) as being anticipated by Loeppert et al. US 5,870,482.

Claims 7-10, 19-20 and 23-28 are rejected under 35 U.S.C. § 103 as being obvious over Loeppert et al. US 5,870,482.

Claims 4 and 22 are rejected under 35 U.S.C. § 103 as being obvious over Loeppert et al. US 5,870,482 in view of Loeppert et al. US 6,535,460.

Claim 1 has been amended to recite:

1. An acoustic diaphragm having a dynamic response extending throughout the audible range, comprising a rigid plate-shaped member supported upon a stiffened edge of a side thereof which pivots on torsional springs, said rigid plate-shaped member having torsional and translational stiffeners, a resonant frequency of the rigid plate-shaped member being substantially dependent on at least a set of physical characteristics of the stiffened edge.

Claim 19 is amended to recite:

19. An acoustic diaphragm having a dynamic response extending throughout the audible range, comprising a plate-shaped member cantilevered about one side thereof from a stiff edge structure, said stiff edge structure being pivotally supported by torsional springs, said plate-shaped member having torsional and translational stiffeners to provide a robust dynamic response to acoustic waves by displacement about said torsional springs extending throughout the audible range, having a dynamic response dominated by a single mode of vibration outside of the audible range which is substantially dependent on said stiff edge structure.

This amendment is supported in the specification in at least original claim 3, and on at least page 3, lines 1-7 and page 5, lines 21-23 ("The supported end has an overlapping T-section, whose length and cross-sectional dimensions can be adjusted to tune the resonant frequency.").

In contrast, Loeppert et al. '482 teach a materially different system, in which the frequency response of the microphone, including the resonant frequency, is controlled by the acoustic compliance and impedance:

> Col. 5, lines 57-67:
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> The low frequency rolloff point of a microphone is determined by the inverse of the product of the back volume compliance, in acoustic farads, and the acoustic resistance of the pressure equalization path, in acoustic ohms. The equalization path in this device is around the edges of the cantilever diaphragm and continuing through the hole in the silicon substrate. For the very small microphones which are sought here, with back volumes on the order of 2 to 3 cubic mm, the acoustic resistance of this path must be quite high, on the order of 1 million acoustic ohms, to maintain flat response down below 100 Hz.

> Col. 6, lines 43-61
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> The great majority of the area under the diaphragm 12 in the previously described structures is directly over the hole 30 in the substrate 16. This means that air displaced by movement of the diaphragm 12 can move freely without appreciable resistance. However, in the area of the capacitor 14, the air is trapped in the 3 to 4 micron capacitor gap 28 between diaphragm and backplate and forced to flow laterally until the air reaches an opening. Due to the viscosity of air and the small dimension of this flow path through the capacitor gap, considerable damping of the diaphragm response can occur. This damping can both affect the high frequency response and add noise to the microphone output. The common method to overcome this is to perforate the backplate, but since in this case the backplate is formed on solid silicon, the damping problem is solved by introducing perforations, or holes, 38 extending through the diaphragm 12, including the movable plate 14b, as shown in FIG. 1a. The use of holes has provided satisfactory response out to 50 kHz.

Thus, in contrast to the presently claim invention of claims 1 and 19, in which the resonant frequency is dependent on the stiffened edge or stiff edge structure, Loeppert et al. '482 provides a structure in which the backspace air substantially controls the acoustic response, including the resonant frequency. The physical stiffness of the supporting element is apparently sufficiently low that damage is possible due in response to acoustic vibrations, and since this presumably undesirable, the compliance of the support must be dominated by another process to prevent this damage:

> Col. 4, lines 49-63:
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> The performance of the cantilevered microphone 10 illustrated in FIG. 1 tends to deviate from the optimum in two respects. **First, because of the**

aforementioned compliance properties of cantilevers versus edge-clamped diaphragms, this cantilever structure as shown in FIG. 1 is actually so compliant that it overloads at the highest sound pressures encountered in certain microphone applications. Second, the cantilevered diaphragm of FIG. 1 fabricated from integrated circuit thin film materials as described above tend to curl due to three sources of unrelieved stress: (1) stress gradients through the thickness of the thin film remaining from deposition; (2) differential stresses caused by the addition of thin chrome or other metallization to the surface of the diaphragm; and (3) unrelieved film stresses at the fixed edge 12a, where the diaphragm 12 is anchored.

The stiffness of the "T" shaped cross section of the present claims can be controlled independently in width, length, height, vertical thickness, and horizontal thickness. The stiffness of the support of Loeppert '482, on the other hand, can only be controlled in width and length, which are interactive with other design parameters. These limited available modifications of Loeppert '482 make it more difficult to obtain the desired high natural frequencies, and thus Loeppert et al. '482 cannot be interpreted to teach or suggest the present claim scope of claims 1 and 19.

Loeppert '460 does not remedy the deficiencies in this regard of Loeppert et al. '482. Therefore, it is respectfully requested that the rejections be withdrawn.

Claims 2, 4-10, 19-20 and 22-28 are believed to be patentable for at least the same reasons as claims 1 and 19, respectively.

It is therefore respectfully submitted that the rejections should be withdrawn. The examiner is respectfully invited to call the undersigned if any issues remain outstanding.

Respectfully submitted,

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